RITEWOOD EGG COMPANY (PWS 6210015)
SOURCE WATER ASSESSMENT FINAL REPORT

June 4, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated source water assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Ritewood Egg Company, Franklin, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The Ritewood Egg Company (Public Water System 6210015) is classified as a community water system. The drinking water system consists of two well sources, Well #1 and Well #2. Well #1 is approximately one-half mile north of Maple Creek and Well #2 is approximately three-eighths mile north of Maple Creek. The wells serve approximately 75 persons through 11 connections.

For Well #1, the potential contaminant sources within the delineation capture zones include an on-site sewage system and the Ritewood Egg Company as a site regulated under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). For Well #2, the potential contaminant sources within the delineation capture zones include underground fuel storage tanks (USTs), dairies, a wastewater land application (WLAP) site, and former leaking underground fuel storage tanks (LUSTs). The Well #2 delineation also includes the Ritewood Egg Company CERCLA site (mentioned above), an abandoned landfill that is also regulated under CERCLA, and a National Pollutant Discharge Elimination System (NPDES). Additionally, Highway 91 is a transportation corridor that crosses the delineation of Well #2. If an accidental spill occurred from this corridor, inorganic chemical contaminants (IOCs), volatile organic chemical contaminants (VOCs), or synthetic organic chemical contaminants (SOCs) could be added to the aquifer system. A complete list of potential contaminant sources is provided with this assessment (Table 1 and Table 2).

For the assessment, a review of laboratory tests was conducted using the Idaho Drinking Water Information Management System (DWIMS) and the State Drinking Water Information System (SDWIS). Total coliform bacteria were detected at various locations in the distribution system. Since July 2001, subsequent samples have not detected total coliform bacteria in the distribution system. Arsenic in both wells has also been at or greater than one-half the newly revised maximum contaminant level (MCL) of 10 micrograms per liter (µg/L). In May 1998, arsenic in both wells was recorded at 8 µg/L and in November 2000 it was recorded at 5 µg/L for both wells. In October 2001, the EPA lowered the arsenic MCL from 50 µg/L to 10 µg/L, giving public water systems until 2006 to comply with the new standard. Other IOCs including barium, cadmium, fluoride, and beryllium have been detected in the wells, but at levels below the MCLs set by the EPA. No VOCs or SOCs have been recorded in either well.

The susceptibility ratings for the Ritewood Egg Company drinking water system were based upon available information relating to soil drainage characteristics, agricultural land use, system construction, and potential contaminant sources identified within the wells' zones of contribution.

In terms of total susceptibility scores, Well #1 automatically rated high to IOCs due to a detection of nitrate in October 2001 at a level above the MCL. It has a moderate susceptibility to VOCs, SOCs, and microbial contaminants. Hydrologic sensitivity scores rated high and system construction scores rated moderate. Potential contaminant inventory and land uses scores were moderate for IOCs, VOCs and SOCs, and low for microbials.

In terms of total susceptibility scores, Well #2 rated high for all potential contaminant categories. Hydrologic sensitivity scores rated high and system construction scores rated moderate. Potential contaminant inventory and land uses scores were high for IOCs, and moderate for VOCs, SOCs, and microbials.

The capture zones for the wells intersect a priority area for the inorganic chemical nitrate. The nitrate priority area is where greater that 25% of wells show nitrate values above 5 milligrams per liter (mg/l). Nitrate concentrations in both wells have consistently been greater than one-half the MCL of 10 mg/L. In fact, in October 2001, nitrate rose to 11.6 mg/L in Well #1, a level greater than the MCL, resulting in an automatic high susceptibility to IOCs for that well.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Ritewood Egg Company, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). If the nitrate and arsenic levels in the wells continue to rise, the Ritewood Egg Company may need to consider implementing engineering controls to protect the drinking water. Also, disinfection practices should be implemented if microbial contamination becomes a problem. No chemicals should be stored or applied within the 50-foot radius of the wellhead. Additionally, there should be a focus on the implementation of practices aimed at reducing the leaching of farm chemicals from agricultural land within the designated source water areas and awareness of the potential contaminant sources within the delineation zones. Since much of the designated protection areas are outside the direct jurisdiction of the Ritewood Egg Company, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation is near urban and residential land uses. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. As there are transportation corridors through the delineation, the Idaho Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Franklin Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR THE RITEWOOD EGG COMPANY, FRANKLIN, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment is also included.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the EPA to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The public drinking water system for the Ritewood Egg Company is comprised of two ground water wells that serve approximately 75 persons through 11 connections. Situated in Franklin County, the wells are located east of the City of Franklin. Well #1 is approximately one-half mile north of Maple Creek. Well #2 is approximately three-eighth mile north of Maple Creek (Figure 1).

The current significant potential water problems affecting the Ritewood Egg Company pertain to the detected levels of nitrate and arsenic in both wells. From 1997 to 2001, the nitrate concentrations in Well #1 have consistently been above one-half the maximum contaminant level (MCL) of 10 mg/L. In October 2001, nitrate concentrations in Well #1 rose above the MCL to 11.6 mg/L, resulting in an automatic high susceptibility to inorganic chemical contaminants (IOCs). Well #2 had nitrate concentrations above 5 mg/L in 1997 and in 2001. Attachment A provides a graph of nitrate concentrations for both wells. Arsenic was also at or greater than one-half the newly revised MCL of 10 μg/L in both wells. In 1998, arsenic in both wells was at 8 μg/L and in 2001 arsenic was at 5 μg/L in both wells. In October 2001, the EPA lowered the arsenic MCL from 50 μg/L to 10 μg/L, giving public water systems until 2006 to comply with the new standard.

No volatile organic chemicals (VOCs) or synthetic organic chemicals (SOCs) have been recorded in either well. Total coliform bacteria have been detected in various sample locations in the distribution system. Since July 2001, subsequent samples have not detected total coliform bacteria in the distribution system. Other IOCs including barium, cadmium, fluoride, and beryllium have been detected in the wells, but at levels below the MCLs set by the EPA. The predominant land use around the wells is agricultural and both delineations cross a nitrate priority area.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with Washington Group International (WGI) to perform the delineations using a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Cache Valley aquifer system in the vicinity of the Ritewood Egg Company. The computer model used site specific data, assimilated by WGI from a variety of sources including the Ritewood Egg Company operator input, Ritewood Egg Company well logs, local area well logs, and hydrogeologic reports (detailed below).

Hydrogeologic Conceptual Model

The Bear River originates in the Uinta Mountains of northern Utah and winds its way through over 500 miles of Wyoming, Idaho, and Utah to terminate in a freshwater bay of the Great Salt Lake just 90 miles west of its source (Dion, 1969, p. 6). The Bear River enters Idaho near Border, Wyoming and flows along the north edge of the Bear River Plateau. Flowing north through the Bear River – Dingle Swamp hydrologic province, it passes into the Soda Springs hydrologic province east of the Bear River Range. Upon entering the Gem Valley – Gentile Valley hydrologic province, it swings south. Now west of the Bear River Range, the river passes through the Oneida Narrows into the Cache Valley hydrologic province. Over most of its course through Idaho, the Bear River is gaining and in direct hydraulic communication with the major aquifer systems of the four hydrologic provinces. The exception is a small reach between the cities of Alexander and Grace where it is generally losing and is perched over the regional fractured basalt aquifer (Dion, 1969, p. 30).

Ground water in the Bear River Basin is found in Holocene alluvium, Pleistocene basalt, and rocks of the "Pliocene (?)" [sic] Salt Lake Formation, pre-Tertiary undifferentiated bedrock, and possibly the "Eocene (?)" [sic] Wasatch Formation (Dion, 1969, pp. 15 and 16). Rocks of the Salt Lake Formation, which include freshwater limestone, tuffaceous sandstone, rhyolite tuff and poorly-consolidated conglomerate, outcrop along the major valley margins and may underlie the valley-fill alluvium (Dion, 1969, pp. 16 and 17). Many of the wells drilled into this formation do not yield water. The few wells that do produce water yield as much as 1,800 gallons per minute (gal/min) from beds of sandstone and conglomerate.

The Wasatch Formation is restricted to the Bear Lake Plateau and small areas northwest of Bear Lake (Dion, 1969, p. 17). The formation is composed largely of tightly cemented conglomerate and sandstone with smaller amounts of shale, limestone, and tuff. The primary pore space is typically impermeable. Water movement may occur through joints and fractures or more permeable zones that are thought to exist along the relatively flat-lying formation (Dion, 1969, p. 17). Springs occur at the margins of the formation.

Precipitation in the basin ranges from 10 inches per year (in./yr) on the floor of Bear Lake Valley to over 45 in./yr on the Bear River Range (Dion, 1969, pp. VII and 11). Applied over the entire basin, precipitation amounts to approximately 2.3 million acre-feet annually. Precipitation is also the principal source of recharge to the basin's aquifers in conjunction with spring snowmelt and runoff, irrigation seepage, and canal losses.

Natural ground water discharge is by flow to the Bear River, springs, seeps along river banks, and evapotranspiration in large marshy areas (Dion, 1969, p. VIII). Some discharge may also occur by way of underflow to the Portneuf River drainage through basalt flows at Tenmile pass and near Soda Point.

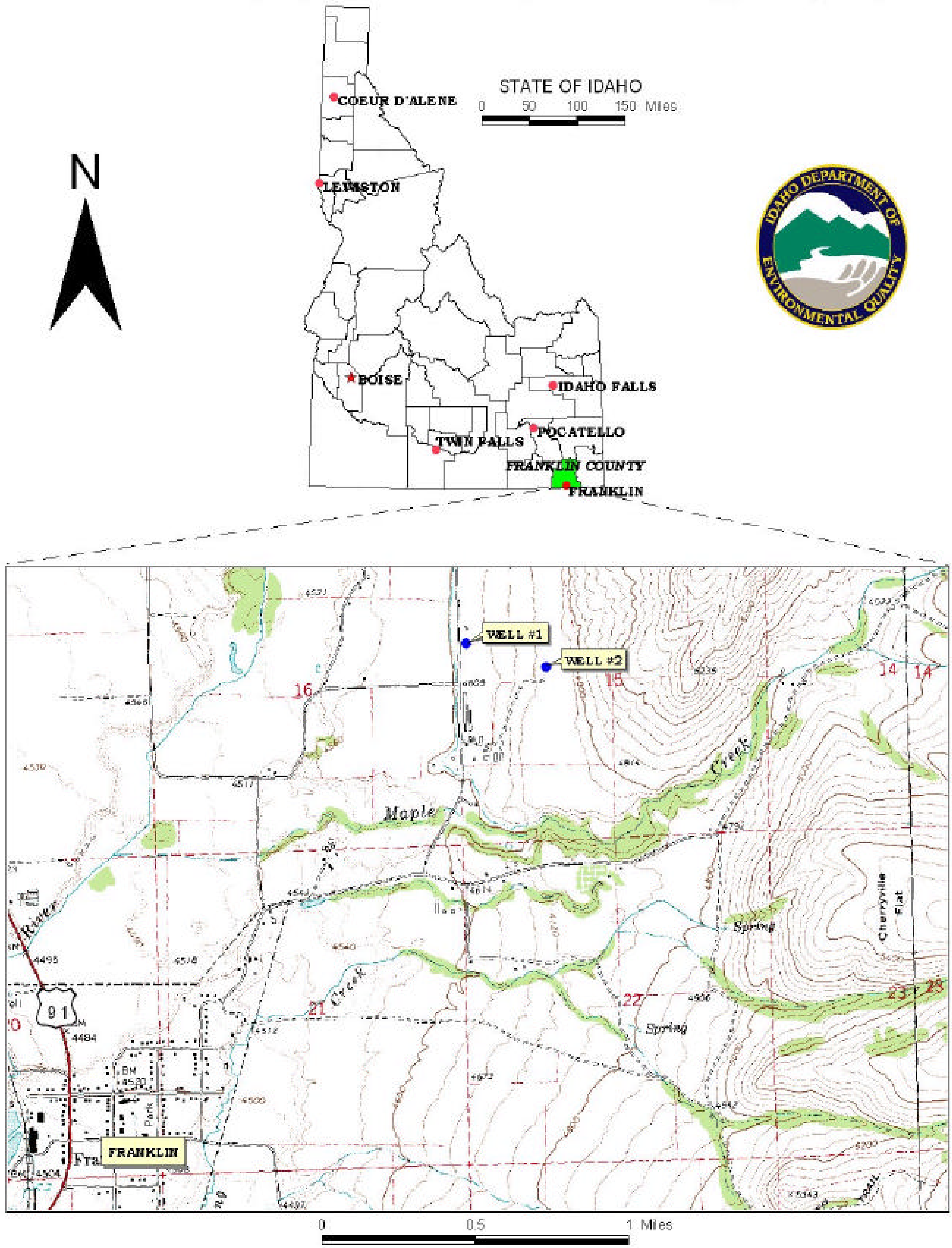
Ground water is obtained from both springs and wells in the Bear River Basin. Hundreds of springs issue primarily from fractures and solution openings in the bedrock on the margins of the basin (Dion, 1969, p. 47). Water production from wells in the four hydrologic provinces is primarily from alluvial and basalt aquifers; however, some wells tap conglomerate, sandstone, limestone and shale aquifers of the Salt Lake and possibly the Wasatch formations (Dion, 1969, p.VII).

Cache Valley

Cache Valley is a complex graben covering about 310 square miles in southeastern Idaho and 350 square miles in northeastern Utah. It was once a bay of ancient Lake Bonneville resulting in lake terraces along the margins of the valley (Dion, 1969, p. 7). The related topographic features and deposits of ancient lakes affect the occurrence and movement of ground water (Bjorklund and McGreevy, 1971, p. 14).

The valley floor consists of unconsolidated valley-fill sediments of Quaternary age from the former Lake Bonneville and older lakes and streams, as well as younger alluvium. The sediments consist of silts and gravel of the Alpine and Bonneville formations, overlain by interfingering beds of gravel, sand, silt, and clay. Alluvial fan and landslide deposits are exposed along the margins of the valley. There is a general coarsening of sediments from lower elevations in the center of the valley to the higher elevations at the valley margins (Johnson et al., 1996). The surrounding mountain ranges consist of highly faulted Tertiary Salt Lake and "Wasatch" formation rocks and Permian through Precambrian rocks (Bjorklund and McGreevy, 1971, Plate 1).

FIGURE 1. Geographic Location of Ritewood Egg Company



The major aquifers are composed of sand and gravel in fans and deltas; interbedded layers of lake-bottom clays and silts confine the aquifers and cause artesian conditions throughout the valley (Bjorklund and McGreevy, 1971, p.14). Deltas and fans from streams entering the valley generally contain a high percentage of gravel and are considered good aquifers (Bjorklund and McGreevy, 1971, p.15). The exception is the Bear River delta, which is composed mostly of fine sand and silt and contains poor aquifers.

Aquifer recharge occurs mainly by infiltration of water from precipitation, streams, canals, ditches, and irrigated lands and by subsurface inflow. A large volume of recharge originates in the Bear River Range where 30 to 50 inches of precipitation fall in most years. Average annual precipitation on the valley floor is approximately 15.5 inches (Bjorklund and McGreevy, 1971, pp. 5 and 18). The principal recharge area is along the margins of the valley that are underlain by permeable unconsolidated materials (Bjorklund and McGreevy, 1971, p. 18). In the lower parts of the valley, some water is recharged to shallow unconfined aquifers, but infiltrated water does not reach the confined aquifers in Idaho because of the upward artesian gradient.

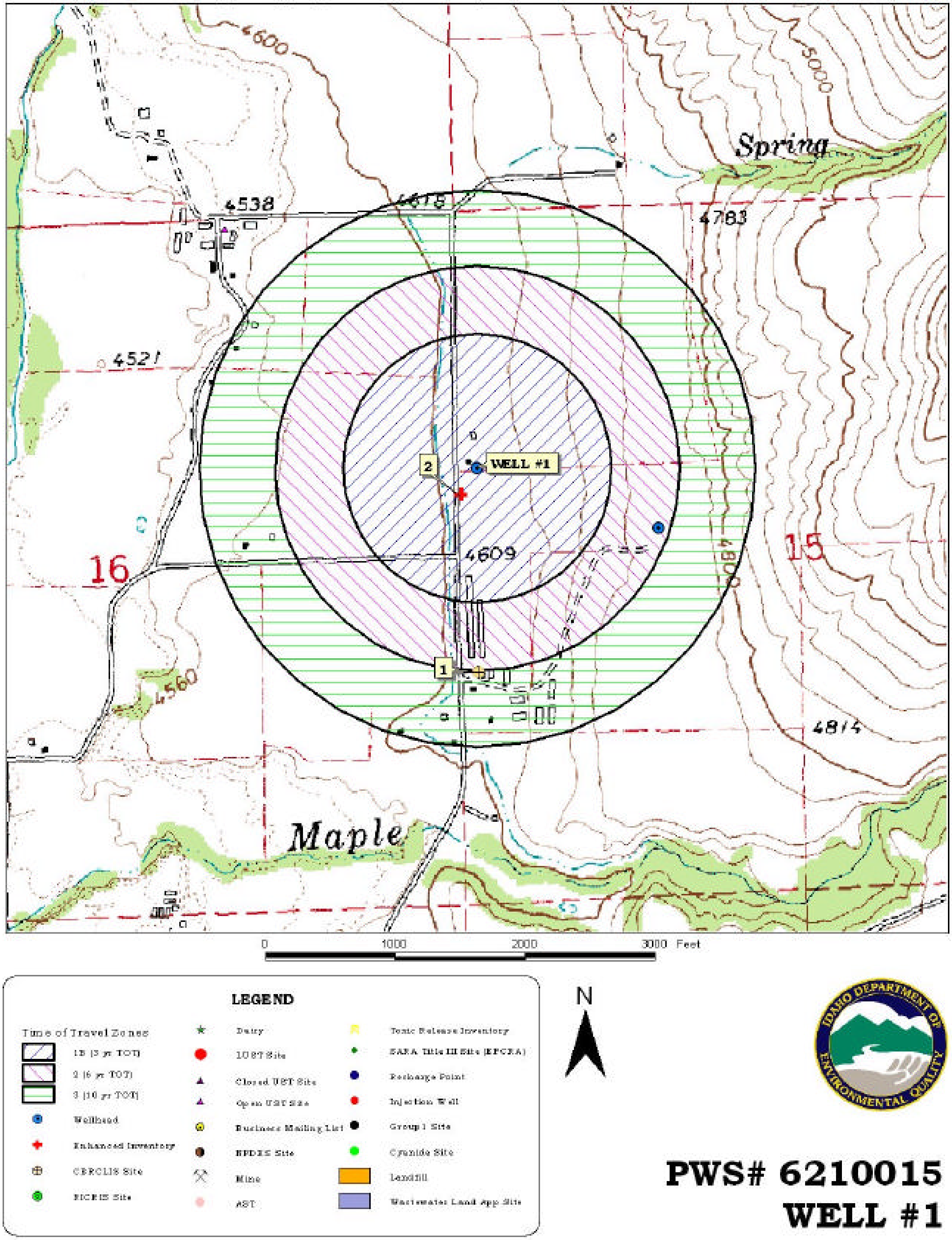
Ground water is discharged by springs, seeps, drains, evapotranspiration, and wells. Many streams in Cache Valley originate at springs and seeps within the valley, and other streams gain in flow as they traverse the valley floor. Potentiometric levels range in elevation from about 4,850 feet mean sea level near Oxford to about 4,500 feet near the Idaho-Utah border. Generally, the ground-water flow direction is locally toward the Bear River and regionally south toward Utah. The Bear River in the Idaho part of Cache Valley is gaining (Bjorklund and McGreevy, 1971, p. 19).

Artesian conditions exist in a large part of the lower valley. Heads of most flowing wells are less than 40 feet above land surface, but heads as high as 62 feet above land surface have been measured (Bjorklund and McGreevy, 1971, p. 22). Water table conditions exist near the edge of the valley beneath alluvial slopes and benchlands. The depth to water is as much as 300 feet below ground surface along the margin of the upper valley.

Most wells in the valley produce water from the unconsolidated basin deposits. Driller's logs indicate that the alluvium may contain several aquifers separated by silt and clay (Dion, 1969, p. 19). The most productive aquifer systems in the Idaho part of Cache Valley are in the area of Weston Creek and in fan deposits along the north and west sides of the valley. Aquifer tests near Weston indicate an average transmissivity of about 30,000 ft^2/day (Bjorklund and McGreevy, 1971, p. 2). Transmissivity values of 5,000 and 40,000 ft^2/day were reported from two tests conducted north of Clifton, Idaho (Johnson et al., 1996, p. 21). All of the Cache Valley wells are located within a couple of miles of the bedrock/valley-fill contact or other near-surface geologic contact.

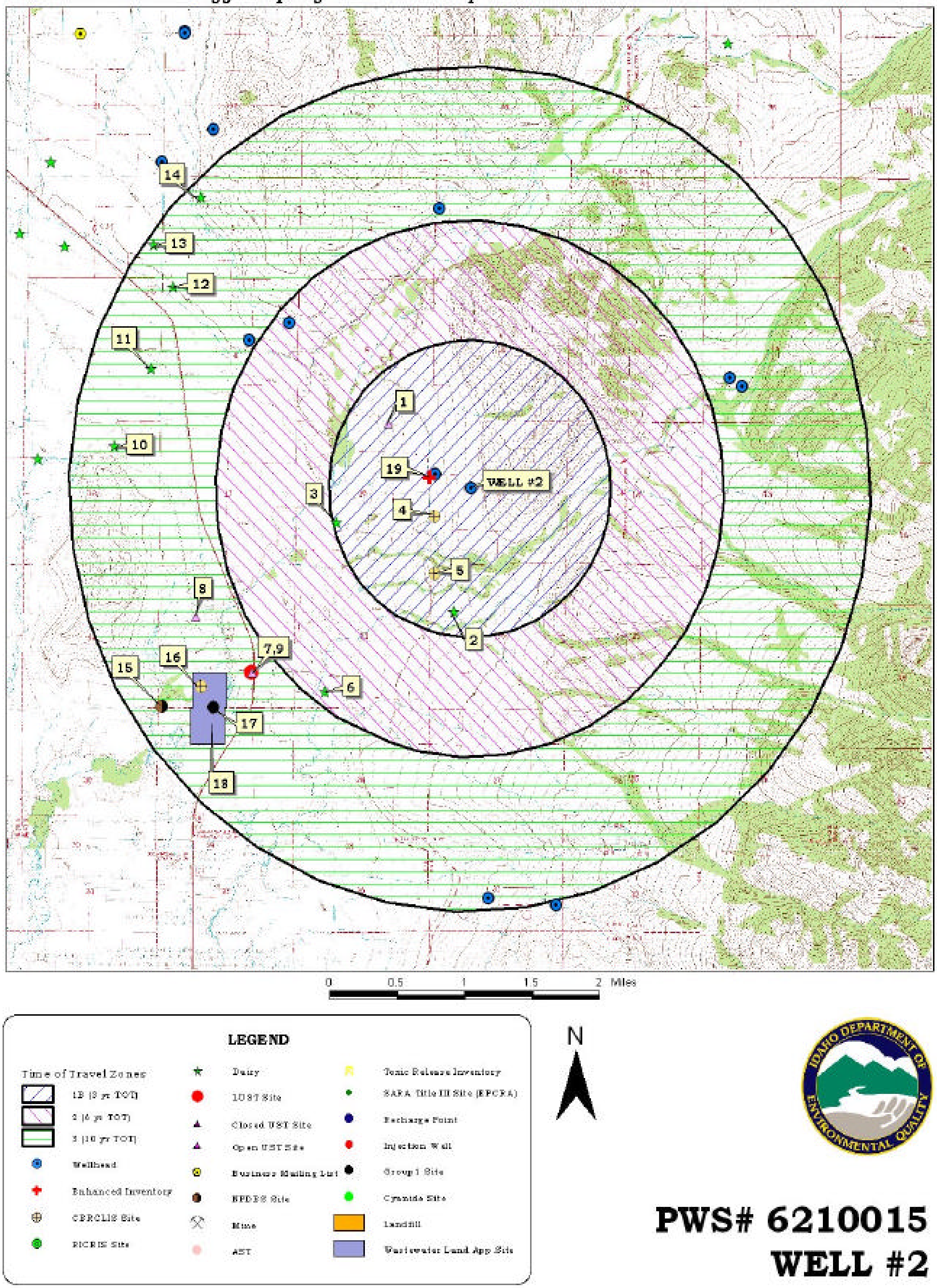
The delineated source water assessment areas for the Ritewood Egg Company wells can best be described as circular areas that extend radially for approximately 1.25 miles for Well #1 and 2 miles for Well #2 (Figure 2 and Figure 3). These wells are located near bedrock/valley-fill contacts and/or faults, where the validity of aquifer homogeneity is questionable, and/or in areas where ground-water flow directions are poorly defined and hydraulic connections between the multiple aquifers in Cache Valley are weak or unknown. It is believed that the use of an analytic element model such as the wellhead analytic element model (WhAEM) where aquifer homogeneity is an underlying assumption would not produce valid delineations; therefore, the decision was made to use the more conservative calculated fixed radius method. The actual data used by WGI in determining the source water assessment delineation areas are available from DEQ upon request.

FIGURE 2. Ritewood Egg Company Delineation Map and Potential Contaminant Source Locations



PWS# 6210015
WELL #1

FIGURE 3. Ritewood Egg Company Delineation Map and Potential Contaminant Source Locations



Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and others, such as cryptosporidium, and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of available databases identified potential contaminant sources within the delineation areas. Some of these sources include underground fuel storage tanks (USTs), dairies, a wastewater land application (WLAP) site, and former leaking underground fuel storage tanks (LUSTs).

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in January through February 2002. The first phase involved identifying and documenting potential contaminant sources within the Ritewood Egg Company source water assessment area (Figure 2 and Figure 3) through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator, Mr. David Woodward, to identify and add any additional potential sources in the area. At the time of the enhanced inventory, no additional potential contaminant sources were found within the delineated source water area. Maps with well locations, delineated areas and potential contaminant sources are provided with this report (Figure 2 and Figure 3). Each potential contaminant source has been given a unique site number that references tabular information associated with the public water well (Table 1 and Table 2).

Table 1. Ritewood Egg Company, Potential Contaminant Inventory for Well #1

Site #	Source Description[1]	TOT Zone (years)[2]	Source of Information	Potential Contaminants[3]
1	CERCLA site- Ritewood Egg Company	6–10	Database Inventory	IOC, VOC, SOC
2	On-site Sewage System	0–3	Sanitary Survey	IOC, Microbes

[1] CERCLA = Comprehensive Environmental Response Compensation and Liability Act
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 2. Ritewood Egg Company, Potential Contaminant Inventory for Well #2

Site #	Source Description[1]	TOT Zone (years)[2]	Source of Information	Potential Contaminants[3]
1	UST site-Farm, Open	0–3	Database Inventory	VOC, SOC
2	Dairy <=200 cows	0–3	Database Inventory	IOC, Microbes
3	Dairy 201-500 cows	0–3	Database Inventory	IOC, Microbes
4	CERCLA site- Ritewood Egg Company: Permit Holder	0–3	Database Inventory	IOC, VOC, SOC, Microbes
5	CERCLA site- Franklin City Abandoned Dump Site: Permit Holder	0–3	Database Inventory	IOC, VOC, SOC, Microbes
6	Dairy <=200 cows	3-6	Database Inventory	IOC
7, 9	LUST –Site Cleanup Incomplete, Impact: Ground Water; UST site-Open	6–10	Database Inventory	VOC, SOC
8	UST site-Open	6–10	Database Inventory	VOC, SOC
10	Dairy 201-200 cows	6–10	Database Inventory	IOC
11	Dairy <=200 cows	6–10	Database Inventory	IOC
12	Dairy <=200 cows	6–10	Database Inventory	IOC
13	Dairy <=200 cows	6–10	Database Inventory	IOC
14	Dairy <=200 cows	6–10	Database Inventory	IOC
15	NPDES-Municipal Discharge	6–10	Database Inventory	IOC, VOC, SOC
16	CERCLA site- Garage over Landfill: Permit Holder	6–10	Database Inventory	IOC, VOC, SOC
17	Group 1- Nitrate	6–10	Database Inventory	
18	WLAP site	6–10	Database Inventory	IOC
19	On-site Sewage System	0–3	Sanitary Survey	IOC, Microbes
	Highway 91	6–10	GIS Map	IOC, VOC, SOC

[1] CERCLA = Comprehensive Environmental Response Compensation and Liability Act, UST = underground storage tank, LUST = leaking underground storage tank, NPDES = national pollution discharge elimination system, WLAP = wastewater land application

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the wells, land use characteristics, and potentially significant contaminant sources. Each of these three categories carries the same weight in the final assessment, meaning that a low score in one category coupled with higher scores in the other categories can still lead to an overall susceptibility of high. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment B contains the susceptibility analysis worksheets for the system. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity rates high for both wells (Table 3). The soils surrounding the area of the wellheads are in the moderate to well-draining soil class as defined by the National Resource Conservation Service (NRCS). A well log for Well #2 was unavailable, preventing the determination of first ground water, the make-up of the vadose zone, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. The well log for Well #1 indicates that the vadose zone is composed predominantly of sandstone and conglomerate with a few thin layers of clay and siltstone. The first ground water is found between 88 feet below ground surface (bgs).

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

For Well #1 the system construction score rated moderate. The 1998 sanitary survey states the wellhead and surface seal are maintained and in good condition. The well log indicates the well was drilled in 1993 to a depth of 295 feet below ground surface (bgs). Well #1 has a 0.250-inch thick, 8-inch diameter steel casing set to a depth of 277 feet bgs into a sandstone formation. The annular seal extends to a depth of 40 feet bgs into a sandstone formation. The well is perforated from 242 to 262 feet bgs and the static water level is found at 45 feet bgs. The average volume of water pumped during a 24-hour period is 43,300 gallons, and the peak pumping rate is 339,840 gal/day. The well is located outside a 100-year floodplain that may decrease the chance of contaminants being drawn into the drinking water sources by surface water flooding.

For Well #2 the system construction score rated moderate. The 1998 sanitary survey states the wellhead and surface seal are maintained and in good condition. There was insufficient well log information to determine if the well casing and annular seal extend into a low permeability unit and if the highest production interval of the well is at least 100 feet below the static water level.

Though the wells may have been in compliance with standards when they were completed, current public water system (PWS) well construction standards are more stringent. The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all public water systems to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Under current standards, all PWS wells are required to have a 50-foot buffer around the wellhead and if the well is designed to yield greater than 50 gallons per minute (gpm) a minimum of a 6-hour pump test is required. These standards are used to rate the system construction for the well by evaluating items such as condition of wellhead and surface seal, whether the casing and annular space is within consolidated material or 18 feet below the surface, the thickness of the casing, etc. If all criteria are not met, the public water source does not meet the IDWR Well Construction Standards. In this case, there was insufficient information available to determine if the wells meets all the criteria outlined in the IDWR Well Construction Standards.

Potential Contaminant Source and Land Use

The potential contaminant sources and land use within the delineated zones of water contribution are assessed to determine the well's susceptibility. When agriculture is the predominant land use in the area, this may increase the likelihood of agricultural wastewater infiltrating the ground water system. Agricultural land is counted as a source of leachable contaminants and points are assigned to this rating based on the percentage of agricultural land. The predominant land use within the delineated capture zones of the Ritewood Egg Company is agricultural land.

In terms of potential contaminant sources and land use susceptibility the ratings are as follows. Well #1 rates moderate for IOCs (i.e. nitrates arsenic), VOCs (i.e. petroleum products), and SOCs (i.e. pesticides), and low for microbial contaminants (i.e. bacteria). Well #2 rates high for IOCs and moderate for VOCs, SOCs, and microbial contaminants. The predominant agricultural land use around the wellheads accounts for the largest contribution of points to the potential contaminant inventory land use rating.

Final Susceptibility Ranking

A detection above a drinking water standard MCL or any detection of a VOC or SOC, at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, if there are contaminant sources located within 50 feet of the source then the well will automatically get a high susceptibility rating. In this case, nitrate was detected in Well #1 at 11.6 mg/L in October 2001, a level greater than the MCL, resulting in an automatic high susceptibility to IOCs. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking.

Table 3. Summary of Ritewood Egg Company Susceptibility Evaluation

Drinking Water Source	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Potential Contaminant Inventory and Land Use				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	H	M	M	M	L	M	H(*)	M	M	M
Well #2	H	H	M	M	M	M	H	H	H	H

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H (*) = an automatic high susceptibility due to the detection of nitrate above the MCL

Susceptibility Summary

Overall, Well #1 has a high susceptibility for IOCs and a moderate susceptibility for VOCs, SOCs and microbial contaminants. Well #2 has a high susceptibility to all potential contaminant categories. Nitrate was detected in Well #1 in October 2001 at 11.6 mg/L, a level greater than the MCL of 10 mg/L. The moderate system construction score and the high hydrologic sensitivity score of Well #2 greatly influenced the final susceptibility of that well to potential contaminants. The predominant agricultural land use of the area and the nitrate priority area contributed to the overall susceptibility of both wells.

The current significant potential water problems affecting the Ritewood Egg Company pertain to the detected levels of nitrate and arsenic in both wells. From 1997 to 2001, the nitrate concentrations in Well #1 have consistently been above one-half the MCL of 10 mg/L. In October 2001, nitrate concentrations in Well #1 rose above the MCL to 11.6 mg/L, resulting in an automatic high susceptibility to IOCs. Well #2 had nitrate concentrations above 5 mg/L in 1997 and in 2001. Attachment A provides a graph of nitrate concentrations for both wells. Arsenic was also at or greater than one-half the newly revised MCL of 10 µg/L in both wells. In 1998, arsenic in both wells was at 8 µg/L and in 2001 arsenic was at 5 µg/L in both wells. In October 2001, the EPA lowered the arsenic MCL from 50 µg/L to 10 µg/L, giving public water systems until 2006 to comply with the new standard.

No VOCs or SOCs have been recorded in either well. Total coliform bacteria have been detected at various locations in the distribution system. Since July 2001 subsequent samples have not detected total coliform bacteria in the distribution system. Other IOCs including barium, cadmium, fluoride, and beryllium have been detected in the wells, but at levels below the MCLs set by the EPA. The predominant land use around the wells is agricultural and both delineations cross a nitrate priority area.

Section 4. Options for Drinking water protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the Ritewood Egg Company, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey. If the nitrate and arsenic levels in the wells continue to rise, the Ritewood Egg Company may need to consider implementing engineering controls to protect the drinking water. Also, disinfection practices should be implemented if microbial contamination becomes a problem. No chemicals should be stored or applied within the 50-foot radius of the wellhead. Additionally, there should be a focus on the implementation of practices aimed at reducing the leaching of farm chemicals from agricultural land within the designated source water areas and awareness of the potential contaminant sources within the delineation zones. Since much of the designated protection areas are outside the direct jurisdiction of the Ritewood Egg Company, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. As there are transportation corridors through the delineation, the Idaho department of transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Franklin Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive source water assessment protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office (208) 236-6160

State DEQ Office (208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper at (208) 343-7001 or email her at mlharper@idahoruralwater.com for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25% of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

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Dion, N.P., 1969, Hydrologic Reconnaissance of the Bear River in Southeastern Idaho, U.S. Geological Survey and Idaho Department of Reclamation, Water Information Bulletin No. 13, 66 p.

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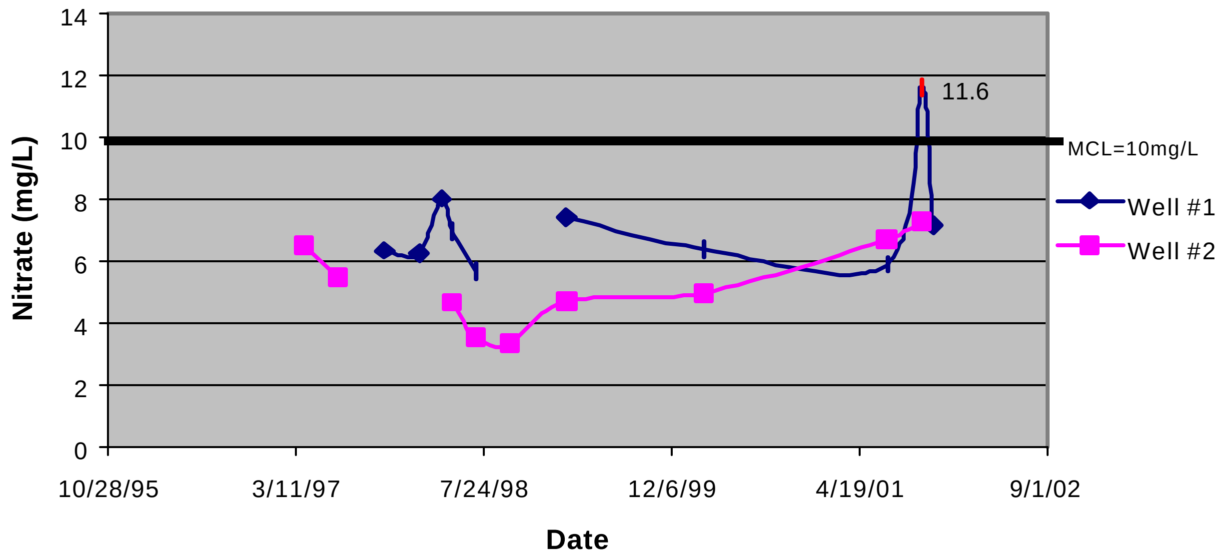
Attachment A

Graph 1: Nitrate Concentrations in the Ritewood Egg Company Wells

Detected Nitrate in Ritewood Egg Company Wells #1 and #2



Attachment B

Ritewood Egg Company
Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

1. System Construction		SCORE			
Drill Date	3/30/93				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	1998			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		3			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		6			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	1	0	0	1
(Score = # Sources X 2) 8 Points Maximum		2	0	0	2
Sources of Class II or III leacheable contaminants or	YES	5	0	0	
4 Points Maximum		4	0	0	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	4	4	6
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		3	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		20	11	11	8

4. Final Susceptibility Source Score	13	11	11	12
5. Final Well Ranking	High	Moderate	Moderate	Moderate

1. System Construction

		SCORE			
Drill Date	unknown				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	1998			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		4			

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		6			

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	5	3	3	5
(Score = # Sources X 2) 8 Points Maximum		8	6	6	8
Sources of Class II or III leacheable contaminants or	YES	9	3	2	
4 Points Maximum		4	3	2	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		18	13	12	12

Potential Contaminant / Land Use - ZONE II

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Sources Present	YES	2	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	2	2	0

Potential Contaminant / Land Use - ZONE III

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0

		IOC Score	VOC Score	SOC Score	Microbial Score
Cumulative Potential Contaminant / Land Use Score		28	20	19	14

4. Final Susceptibility Source Score	16	14	14	15
5. Final Well Ranking	High	High	High	High